ABSTRACT OF THE DISCLOSURE

A micromachined device for efficient thermal processing at least one fluid stream includes at least one fluid conducting tube having at least a region with wall thickness of less than 50 μm. The device optionally includes one or more thermally conductive structures in thermal communication with first and second thermally insulating portions of the fluid conducting tube. The device also may include a thermally conductive region, and at least a portion of the fluid conducting tube is disposed within the region. A plurality of structures may be provided projecting from a wall of the fluid conducting tube into an inner volume of the tube. The structures enhance thermal conduction between a fluid within the tube and a wall of the tube. A method for fabricating, from a substrate, a micromachined device for processing a fluid stream allows the selective removal of portions of the substrate to provide desired structures integrated within the device. As an example, the micromachined device may be adapted to efficiently react fluid reactants to produce fuel for a fuel cell associated with the device, resulting in a system capable of conversion of chemical to electrical energy.